

**Standard Operating Procedure
Compensatory Mitigation
WETLANDS, OPENWATER & STREAMS**

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1. Applicability. This Standard Operating Procedure (SOP) is applicable to regulatory actions requiring compensatory mitigation for adverse impacts to 10 acres or less of wetland or other open waters, and/or 5000 linear feet or less of intermittent and/or perennial stream (Definitions, 65 FR Vol. 47, Page 12898). This SOP may be used as a guide in determining compensatory mitigation requirements for projects with impacts greater than the above wetland and stream limits, or for enforcement actions, however, higher than calculated credit requirements would likely be applicable to larger impacts. In instances where it is unclear whether the jurisdictional area proposed to be impacted is a wetland, a stream, or other waters, the US Army Corps of Engineers (USACE) will make the final determination. This SOP does not address mitigation for categories of effects other than ecological (e.g., historic, cultural, aesthetic). Types of mitigation other than compensation (e.g., avoidance, minimization, reduction) are not addressed by this SOP. As an alternative to proposing a site specific mitigation plan, you may consider purchasing the required mitigation credits from a wetland or stream mitigation bank. For impacts in areas not serviced by approved wetland or stream banks, wetland or stream in-lieu-fee banking, as appropriate, may be proposed.

When this SOP is used in the establishment of a Mitigation Bank, the USACE will consult with the Mitigation Bank Review Team (MBRT), with the goal of achieving a consensus of the MBRT regarding the factors, elements, and design of the Mitigation Bank Plan. Once a mitigation bank receives final approval using a dated version of this SOP, that version would remain valid for that bank unless the bank is amended or substantially modified. In other words, an approved bank cannot use a later version of this SOP to possibly generate more credit, unless the Banking Instrument (BI) for the approved bank is amended for use a later version of the SOP, and this amendment of the BI is approved by the MBRT.

Also, note that this document is subject to periodic review and modification, and consultation with the local USACE office is necessary to ensure utilization of the latest approved version. However, once a project is permitted using a dated version of this SOP, that version would remain applicable to the project, unless the project is substantially modified. With regard to approved mitigation banks, the version of the SOP used to calculate credits generated by the bank would remain applicable to that bank for the purpose of re-calculating credits associated with proposed minor modifications to the bank. If a substantial modification is proposed for an approved mitigation bank, the last approved version may be required for use in re-calculating credits. Regardless of which version of the SOP might have been used to calculate credits for an approved mitigation bank, permit applicants intending to purchase mitigation bank credits are required to use the latest approved version of the SOP when calculating credit requirements. All decisions on which version of this SOP are applicable to any given situation will be made by the USACE, and are final.

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2. Purpose. The intent of this SOP is to provide a basic written framework, which will provides predictability and consistency for the development, review, and approval of compensatory mitigation plans. A key element of this SOP is the establishment of a method for calculating mitigation credits. While this method is not intended for use as project design criteria, appropriate application of the method should minimize uncertainty in the development and approval of mitigation plans and allow expeditious review of applications. However, nothing in this SOP should be interpreted as a promise or guarantee that a project which satisfies the criteria or guidelines given herein will be assured of a permit. The District Engineer (DE) has a responsibility to consider each project on a case by case basis and may determine in any specific situation that authorization should be denied, modified, suspended, or revoked. This SOP does not obviate or modify any requirements given in the 404(b)(1) Guidelines or other applicable documents regarding avoidance, sequencing, minimization, etc. Such requirements shall be evaluated during consideration of permit applications.

3. Other Guidance.

3.1. Mitigation Thresholds. Projects impacting less than 0.1 acre of wetland or open water and/or less than 100 linear feet of stream will be required to provide mitigation on a case-by-case basis. Projects impacting greater than 0.1 acre of wetlands or open water and/or more than 100 linear feet of stream will usually have to at least satisfy the requirements of this SOP.

3.2 Minimal Impacts. Permit applicants with projects impacting more than 0.1 and less than 1.0 acres of wetland and/or more than 100 and less than 300 linear feet of stream may choose to use the following abbreviated methodology for calculating mitigation credit requirements:

- Multiply the acres of impact by 8 to arrive at the required number of wetland mitigation credits (eg, 0.5 acres of wetland impact $\times 8 = 4$ wetland credits).
- Multiply the linear feet of stream impact by 6.5 to arrive at the required number of stream mitigation credits (eg, 100 linear feet of stream $\times 6.5 = 650$ stream credits).

3.3 Regulatory Guidance Letter 02-02. On December 24, 2002, the USACE issued Regulatory Guidance Letter 02-02 (RGL 02-02). Guidance provided in RGL 02-02 is applicable to all compensatory mitigation proposals associated with permit applications submitted for approval after it's date of issuance. If a discrepancy is discovered between this SOP and RGL 02-02, or any other relevant guidance, the applicant should notify the USACE of the discrepancy and request clarification before incorporating any such guidance into a proposed mitigation plan.

3.4 National Research Council's (NRC) Mitigation Guidelines. In its comprehensive report entitled "*Compensating for Wetland Losses Under the Clean Water Act*," the National Research Council (NRC) provided ten guidelines to aid in planning and implementing successful mitigation projects ("Operational Guidelines for Creating or Restoring Wetlands that are Ecologically Self-Sustaining"; NRC, 2001). Please note that these guidelines also pertain to restoration and enhancement of other aquatic resource systems, such as streams. Each of the ten guidelines can generally be described as A) basic requirement for mitigation success, or B) guide for mitigation site selection. A copy of the NRC Mitigation Guidelines is enclosed. The NRC Guidelines are referenced throughout this document.

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4. Mitigation Plans. The following information will typically be required for consideration of a mitigation proposal. Proposals will be reviewed and the applicant will be advised if additional information will be required to make the proposal adequate for consideration. See attached Mitigation Plan Checklist for more details.

- Plans and detailed information regarding the work for which the mitigation is required.
- Drawings in accordance with the requirements given in this SOP.
- A narrative discussion of the key elements of the proposed mitigation plan.
- A narrative description of any proposed functional assessment methodology (HGM, WRAP, etc.).
- A proposed monitoring plan and a plan for documenting baseline conditions of the mitigation site.
- Names, addresses, and phone numbers for all parties responsible for mitigation and monitoring.
- A description of the existing conditions of all areas to be affected by the proposed mitigation.
- A description of the existing vegetative communities to be affected by the proposed mitigation.
- Native vegetation proposed for planting and/or allowances for natural regeneration.
- Plans for control of exotic invasive vegetation.
- Elevation(s) and slope(s) of the proposed mitigation area to ensure they conform with required elevation and hydrologic requirements, if practicable, for target plant species.
- Source of water supply and connections to existing waters and proximity to uplands.
- Stream or other open water geomorphology and features such as riffles and pools, bends, etc.
- An erosion and sedimentation control plan.
- A schedule showing earliest start and latest completion dates for all significant activities.
- A listing of measurable success factors with quantifiable criteria for determining success.
- Definitions for all success factors and other significant terms used in the plan.
- Description of the equipment, materials, and methods required for execution of the plan.
- A management plan, if necessary, for any maintenance of the mitigation.
- A contingency plan, in the event that the mitigation fails to meet success factors.
- Copy of deed to property showing owner(s) of property.
- List of all easements and right-of-ways on the property.

5. General Guidelines. Mitigation must be designed in accordance with the following guidelines.

5.1. Adverse Effects Area. The area of adverse effects as used in this document includes aquatic areas impacted by filling, excavating, flooding, draining, clearing, or other adverse ecological effects. Impacts to wetlands and other open waters will be calculated in acres and impacts to streams will be calculated in linear feet as measured along the centerline of the channel. Other categories of effects such as aesthetic, cultural, historic, health, etc., are not addressed by this document. As explained in Attachments A and C, direct effects are caused by the action and occur at the same time and place; and indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

5.2. Mitigation Area. In general, the adverse impacts and compensatory mitigation are geographically distinct areas. The aquatic area in which the adverse effects occur will generally not be given credits as part of the compensatory mitigation area. For example, if a pond is excavated in wetlands with a resulting wetland fringe, the wetland fringe is generally not considered compensation for the excavation impacts. Similarly, an impoundment of a riverine system with a resulting increase in open surface water area or wetland fringe is not considered compensatory mitigation for the adverse impacts to the impounded riverine system. Certain exceptions may be allowed on a case-by-case basis. For example, a temporary

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construction impact (e.g., cofferdams, access roads, staging areas) might be mitigated by restoration or preservation of the area, depending on the nature, severity, and duration of the impacts.

A compensatory mitigation area may not be given credits under more than one mitigation category nor credited more than once under any category. However, it is acceptable to subdivide a given area into sub-areas and calculate credits for each sub-area separately. For example, a restored aquatic area donated to a conservancy organization may be credited as either restoration or preservation, but not both. An aquatic area that contains some restoration (e.g., plugging canals in a drained wetland) and some enhancement (e.g., plugging shallow ditches in an impaired wetland) could either be subdivided into a restoration area component and an enhancement area component, or the entire area could be lumped together and given one net enhancement/restoration credit calculation. Whether or not an area is subdivided or lumped for the purpose of credit calculations is a case-by-case decision based on what is reasonable and appropriate for the given mitigation proposal. All decisions on whether a proposed mitigation action would be considered restoration, enhancement or a combination of both, will be made by the USACE, and these decisions are final.

5.3 Restrictive Covenants (RC). In most cases, mitigation sites must be perpetually protected by a Declaration of Covenants and Restrictions, whereby the owner of the property places permanent conservation restrictions on identified mitigation property. The restrictive covenant restricts development and requires that the land be managed for its conservation values. The draft model and instructions for use with the Declaration of Covenants and Restrictions is located on the USACE, Savannah District, web site located at www.sas.usace.army.mil. The web site should be viewed in order to assure that the latest version is used. Select the yellow box titled, "Permitting Info." Under the bold paragraph titled, "Savannah District Regulatory Publications," scroll down to find the Declaration of Covenants and Restrictions draft and instructions. The restrictive covenant is prepared by an attorney for the property owner in consultation with the environmental consultant. Property owners should make allowances for any foreseeable circumstances (e.g., utility lines, power lines, road crossings, ditch maintenance, etc.) that may conflict with recording a restrictive covenant on mitigation property. Once a property is protected by restrictive covenant, further impacts to that property are strongly discouraged by the USACE. The procedure for modifying a restrictive covenant is also located on the above web site.

5.4 Conservation Easement (CE). In addition to the restrictive covenant requirement, additional credit may be obtained by the granting of a conservation easement by the owner of the property, to a qualified third party grantee. The grantee must be a holder as defined by the Georgia Uniform Conservation Easement Act, O.C.G.A. § 44-10-1 et seq. In addition, the conservation easement is required to have certain language and meet the standards set out in the guidance. The guidance on conservation easements accepted for credit is located on the Savannah District web site under the file titled, "Conservation Easements." The conservation easement is prepared by the attorney for the owner of the property in consultation with the grantee and reviewed by the USACE.

5.5 Government/Public Protection (GPP). In addition to the restrictive covenant requirement, extra credit may be given if the property is conveyed to and/or held or managed by a governmental/public entity and the property is further protected for its conservation and environmental functions by legislation, resolution, environmental designation or zoning for the benefit of the public and the citizens of Georgia. The governmental entity may be an agency or department of the United States charged with protection and management of the environment; a state agency or department charged with protection and management of the environment such as the Department of Natural Resources; an authority created by the legislature such as a Greenway Authority; or property held by a county and/or municipality where the property qualifies for and is listed as a Community Greenspace Program property, or is designated for use by the public as a park or greenway and is used only for passive recreational/educational purposes; and property held by an

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accredited university in Georgia for the stated purpose of environmental management, education and training.

5.6 Buffers. In most circumstances, wetland, open water and stream mitigation areas must include the establishment and maintenance of buffers to ensure that the overall mitigation project performs as expected. Buffers are upland or riparian areas that separate aquatic resources from developed areas and agricultural lands. Buffers typically consist of native plant communities (i.e., indigenous species) that reflect the local landscape and ecology. Buffers enhance or provide a variety of aquatic habitat functions including habitat for wildlife and other organisms, runoff filtration, moderation of water temperature changes, and detritus for aquatic food webs.

5.6.1 Upland Buffer. Upland buffers serve to enhance aquatic functions and increases the overall ecological functioning of wetland and open water mitigation areas. Upland buffers are necessary for wetlands or open water mitigation areas that perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. Therefore, unless it can be demonstrated that an upland buffer is not necessary or practicable, wetland and openwater mitigation plans must include a minimum 25' wide upland buffer on at least 95% of the jurisdictional boundary of the mitigation area (i.e., verified wetland/upland boundary on the mitigation area). Mitigation areas will generally not be considered acceptable if they do not include a minimum 25' upland buffer. This required 25' minimum width upland buffer receives no mitigation credit. Only the area of a proposed upland buffer in excess of the minimum 25', which meets the width required at *Attachment B*, "Minimum Upland Buffer Widths for Mitigation Credit," will receive consideration for mitigation credit. Portions of buffers may be excluded from calculation of credits if they have been compromised or are of questionable protection value due to shape, condition, location, excessive width, excessive proportion of the total mitigation area, or other factors. Wetlands or other aquatic areas cannot be used as buffers on wetlands or open waters. Wetland buffer credit can be calculated using the Upland Buffer Worksheet.

5.6.2 Riparian Buffer. Riparian Buffers serve to enhance aquatic functions and increases the overall ecological functioning of stream mitigation. Riparian Buffers are necessary for streams that: 1) perform important physical, chemical, or biological functions, the protection and maintenance of which is important to the region where those aquatic resources are located; and 2) are under demonstrable threat of loss or substantial degradation from human activities that might not otherwise be avoided. Therefore, in most cases stream restoration plans must include a vegetated buffer. Riparian buffers that do not meet the appropriate minimum width requirements cannot be included in calculating credits (*Attachment D*, Riparian Enhancement and Preservation). Wetlands or other aquatic areas used to generate wetland mitigation credits cannot be used to generate stream buffer credits (i.e., multiple mitigation cannot be generated from one area).

5.7. No Net Loss. To assist in meeting the national policies of "no net loss" of wetlands and/or aquatic function, at least 50% of the wetland mitigation credits required for an authorized project must be generated from mitigation activities that result in a net gain in acres and/or aquatic function (i.e., wetland restoration, enhancement or creation), and at least 50% of the stream mitigation credits required for an authorized project must be from stream and/or riparian restoration. Wetland and stream bank credits are considered functional replacement. Conversely, no more than 50% of the wetland mitigation credits required for an authorized project can be generated from wetland preservation and/or upland buffering, and no more that 50% of the stream mitigation credits required for an authorized project can be generated from riparian buffer and/or stream preservation. In-lieu-fee bank credits are considered preservation. On a case-by-case basis, 100% of the wetland and/or stream mitigation credits required for an authorized

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project may be in the form of in-lieu-fee banking, but only if no commercial mitigation bank services the project area and site specific mitigation would be impractical.

5.8. *Goals and Objectives.* Compensatory mitigation plans should discuss environmental goals and objectives, the aquatic resource type(s), e.g., hydrogeomorphic (HGM) regional wetland subclass, Rosgen stream type, Cowardin classification, and functions that will be impacted by the authorized work, and the aquatic resource type(s) and functions proposed at the compensatory mitigation site(s). For example, for impacts to tidal fringe wetlands the mitigation goal may be to replace lost finfish and shellfish habitat, lost estuarine habitat, or lost water quality functions associated with tidal backwater flooding. The objective statement should describe the amount, i.e., acres, linear feet, or functional changes, of aquatic habitat that the authorized work will impact and the amount of compensatory mitigation needed to offset those impacts, by aquatic resource type.

5.9. *Site Selection (See NRC # B 1-5).* Compensatory mitigation plans should describe the factors considered during the site selection process and plan formulation including, but not limited to:

5.9.1 *Location.* Mitigation is required to be, when practicable, in areas adjacent or contiguous to the discharge site (on-site compensatory mitigation). On-site mitigation generally compensates for locally important functions, e.g., local flood control functions or unusual wildlife habitat. However, off-site mitigation may be used when there is no practicable opportunity for on-site mitigation, or when off-site mitigation provides more watershed benefit than on-site mitigation, e.g., is of greater ecological importance to the region of impact. Off-site mitigation will be in the same geographic area, i.e., in close proximity to the authorized impacts and, to the extent practicable, in the same watershed. The following factors that should be considered when choosing between on-site or off-site compensatory mitigation: likelihood for success; ecological sustainability; practicability of long-term monitoring and maintenance or operation and maintenance; and relative costs of mitigation alternatives. See NRC # A 1-4.

5.9.2. *Watershed Considerations.* Mitigation plans should describe how the site chosen for a mitigation project contributes to the specific aquatic resource needs of the impacted watershed. A compensatory mitigation project generally should be located in the same "State of Georgia Hydrologic Map Cataloging Unit (i.e., 8-Digit Unit)" as the impact site. The further removed geographically that the mitigation is, the greater is the need to demonstrate that the proposed mitigation will reasonably offset authorized impacts. For guidance on service areas for mitigation banks, see *Attachment E "Mitigation Bank Service Areas."*

5.9.3. *Practicability.* The mitigation plan should describe site selection in terms of cost, existing technology, and logistics.

5.9.4. *Air Traffic.* Compensatory mitigation projects that have the potential to attract waterfowl and other bird species that might pose a threat to aircraft will be sited consistent with the Federal Aviation Administration Advisory Circular on Hazardous Wildlife Attractants on or near Airports (AC No: 150/5200-33, 5/1/97).

5.10. *Scheduling.* In most cases, mitigation should be completed concurrent with authorized impacts to the extent practicable. Advance or concurrent mitigation can reduce temporal losses of aquatic functions and facilitate compliance. However, it is recognized that because of equipment utilization it may be necessary to perform the mitigation concurrent with the overall project. This is usually acceptable provided the time lag between the impacts and mitigation is minimized and the mitigation is completed within one growing season following commencement of the adverse impacts. In general, when impacts to

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aquatic resources are authorized to proceed before an approved mitigation plan can be initiated, the permittee will be required to secure the mitigation site and record a restrictive covenant.

5.11. *Maintenance.* Mitigation plans which require perpetual or long-term human intervention will usually not be acceptable. Mitigation areas should be designed to be naturally sustaining following the completion of the mitigation. Hydrology must be adequately considered since plans requiring an energy subsidy (pumping, intensive management, etc.) will normally not be acceptable. The goal is to achieve a natural state that does not depend upon maintenance. Plans with maintenance will be discouraged. See NRC # A2 and 3.

5.12. *Pre-project Consultation.* To minimize delays and objections during the permit review process, applicants are encouraged to seek the advice of resource and regulatory agencies during the planning and design of mitigation plans. For complex mitigation projects, such consultation may improve the likelihood of mitigation success and reduce permit processing time. Furthermore, developers should typically seek advice from consultants on complicated mitigation projects.

5.13. *Lakes, Ponds, and Impoundments.* Mitigation using lakes, ponds, and impoundments may be allowed as compensation for impacts to similar waterbodies. Mitigation using lakes, ponds, or impoundments will generally not be acceptable as compensatory mitigation for adverse impacts to wetlands. Additionally mitigation using wetlands, lakes, ponds, or impoundments will generally not be acceptable as compensatory mitigation for adverse impacts to riverine systems. It is understood that open surface waterbodies provide some valuable public interest factors such as storm water storage, fisheries habitat, or ground water recharge. Therefore, in recognition of this fact, the adverse effect factors for flooding and impounding have been adjusted relative to other factors.

6. Monitoring and Contingency Plans. The applicant will normally be required to monitor the mitigation area for success and to provide written reports describing the findings of the monitoring efforts. Such reports will normally involve photographic documentation, information on survival rates of planted vegetation, and information on the monitored hydrology. Because of the many variables involved, no specific standards are set forth as a part of this policy. Instead, a monitoring plan should be submitted as a part of the mitigation proposal for review. Monitoring efforts should usually include periodic reviews in the first year and annually thereafter (See NRC # A5). For major mitigation projects, the plan should include contingency measures specifying remediation procedures which will be followed should the success criteria or scheduled performance criteria not be fully satisfied. Monitoring and contingency plans typically address the following items, as applicable:

- A narrative discussion of the key elements of the proposed monitoring and contingencies plan.
- Names of party(s) responsible for the monitoring and contingencies plan.
- A description of the baseline conditions (e.g., soils, hydrology, vegetation, and wildlife).
- A schedule for monitoring activities and reporting.
- A listing of measurable success factors with quantifiable criteria for determining success.
- Definitions for success factors and other terms used in the plan.
- Descriptions of equipment, materials, and methods to be used.
- Proposed protective measures (e.g., restrictive covenants or conservation easements).
- Vegetation monitoring and contingency plan.
- Hydrological monitoring and contingency plan.
- Designation of reference site.
- For stream mitigation, monitoring of physical parameters.

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7. Performance Standards. Compensatory mitigation plans will contain written performance standards for assessing whether mitigation is achieving planned goals. Performance standards will become part of individual permits as special conditions and be used for performance monitoring. Project performance evaluations will be performed by the USACE, as specified in the permits or special conditions, based upon monitoring reports. Adaptive management activities may be required to adjust to unforeseen or changing circumstances, and responsible parties may be required to adjust mitigation projects or rectify deficiencies. The project performance evaluations will be used to determine whether the environmental benefits or "credit(s)" for the entire project equal or exceed the environmental impact(s) or "debit(s)" of authorized activities. Performance standards for compensatory mitigation sites will be based on quantitative or qualitative characteristics that can be practicably measured. The performance standards will be indicators that demonstrate that the mitigation is developing or has developed into the desired habitat. Performance standards will vary by geographic region and aquatic habitat type, and may be developed through interagency coordination at the regional level. Performance standards for wetlands can be derived from the criteria in the 1987 Corps of Engineers Wetlands Delineation Manual, such as the duration of soil saturation required to meet the wetland hydrology criterion, or variables and associated functional capacity indices in hydrogeomorphic assessment method regional guidebooks. Performance standards may also be based on reference sites.

8. Drawings. Mitigation plans should include drawings in conformance with the following.

a. Drawings must be provided on 8.5 x 11" paper. For larger mitigation projects, 11 x 17" or larger drawings should be submitted, in addition to 8.5 x 11" drawings. Generally, all drawings should have a scale no smaller than 1"=200'. Drawings must be clear, readable, and reproducible on standard, non-color office copiers. Each drawing sheet should include the following:

- An unused margin of no less than ½".
- An appropriate graphic scale (when reasonable).
- All significant dimensions clearly indicated and annotated.
- Title block with applicant's name, project title, site location, drawing date, and sheet number.
- A directional arrow indicating north.
- A clear, legible plan view indicating area sizes (e.g., square feet, acres) for all mitigation sites.

b. Location maps for the proposed activity must be included. Two maps are desired. A County road map and a US Geological Quadrangle map are preferred as sources. The location maps must show roads leading to the site and must include the name or number of these roads. The project latitude and longitude should be annotated on the maps. Each map should include a title block.

c. Plan views of the proposed mitigation must be included. These drawings must show the general and specific site location and character of all proposed activities, including the relationship of all proposed work to Waters of the United States in the vicinity of the project.

d. For ground-disturbing mitigation work, cross section views must be submitted depicting the existing ground contours and the proposed finished contours.

e. All aquatic areas within the project boundaries (avoided, impacted, or mitigated) must be shown.

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- f. Each restoration, enhancement, preservation, creation and upland buffer area must be shown.
- g. A legend must be shown identifying cross-hatching, shading, or other marking techniques used.
- h. A summary table with the quantity of each category of impact and mitigation must be provided.
- i. Show the ordinary high water line of affected and adjacent non-tidal open surface waterbodies.
- j. Show the mean high tide line and spring high tide line of affected and adjacent tidal waterbodies.

k. For mitigation plans with more than ten acres of wetland restoration, enhancement, creation and upland buffer, or a combination thereof, certified topographic drawings showing the contours and elevations of the completed mitigation area may be required. The drawings should show types of plantings, locations of plantings, and all structures and work that are a significant part of the mitigation.

9. Mitigation Banking. Proposals to establish mitigation banks will be processed in accordance with "Guidelines on the Establishment and Operation of Wetland Mitigation Banks in Georgia." Proposals which include use of credits from a mitigation bank must normally comply with the requirements given in this SOP as well as any conditions or restrictions applicable to the bank. Guidance on the appropriate use of mitigation bank credits is contained in the document titled "Addendum 1 - Guidelines on the Establishment and Operation of Wetland Mitigation Banks in Georgia," dated January 16, 1996. This document is available on the Savannah District web site.

10. Point of Contact. Copies of this document are available at Savannah District's Regulatory Office. Questions regarding use of this policy for specific projects must be addressed to the Project Manager handling the action. Other inquiries or comments regarding this document should be addressed to:

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11. Authorizing Signature. By the signature given below, this draft SOP is authorized for use.

Mirian Magwood
Chief, Regulatory Branch

ATTACHMENTS:

- A. [Wetland Mitigation Definition of Factors](#)
- B. [Wetland/Openwater Mitigation Worksheets](#)
- C. [Stream Mitigation Definition of Factors](#)
- D. [Stream Mitigation Worksheets](#)
- E. [Draft Wetland and Stream Mitigation Bank Service Areas](#)

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- F. [Incorporation of the National Research Council's Mitigation Guidelines into the CWA Section 404 Program](#)
- G. [Mitigation Plan Checklist and Supplement](#)

Compensatory Stream Mitigation Definitions of Factors

Net benefit is an evaluation of the proposed mitigation action's ability to restore and sustain the chemical, biological, and physical integrity of the Nation's waters. Six stream restoration methods are covered under this SOP – stream channel restoration/relocation, removal of culverts/dams or other instream structures that block flow or fish movement, streambank repair, riparian restoration, riparian habitat improvement, and riparian preservation. The USACE will determine, on a case-by-case basis, the net benefit for actions that do not involve direct manipulation of a length of stream and/or its riparian buffers, such as returning natural flows to relict channels dewatered by drainage canals, retrofitting stormwater detention facilities, construction of off-channel stormwater detention facilities in areas where runoff is accelerating streambank erosion, measures to reduce septic tank leakage, paving of dirt roads, contaminant reduction, stormwater surcharge reduction and other watershed protection practices. (Note: Off-channel stormwater detention facilities should not be placed in jurisdictional wetlands, forested floodplains, or riparian buffer zones.) Stream mitigation within 100' of a culvert, dam, or other man-made impact to waters of the United States generally will generate only minimal restoration or preservation credit due to impacts associated with these structures.

- **Stream Channel Restoration and Relocation:** **Stream Channel Restoration** refers to actions to convert an incised, unstable stream channel to a natural stable condition, considering recent and future watershed conditions. Stream channel restoration will be appropriate for streams described below under Existing Conditions as Fully Impaired, and with Corps' discretion, on streams described under Existing Conditions as Somewhat Impaired. Restoration or relocation of a stream that is considered Fully Functional will not be considered for mitigation credit.
- **Stream Relocation** means to move an existing stream channel and reconstruct it, in a new location to allow an authorized project to be constructed in the stream's former location. Only Priority 1 restoration is acceptable for stream relocation projects. Note: Fill of the original channel for a stream relocation is considered an impact and shall be included in calculations for required mitigation credit (Worksheet 1).

Design of a restored or relocated channel should be based on a reference reach and include restoration of appropriate pattern, profile, and dimension, as well as transport of water and sediment produced by the stream's upstream watershed. This SOP provides for four levels of stream restoration or relocation:

- **Priority 1 Restoration/Relocation** involves excavation of a stable Rosgen Class C or E stream channel, on previous floodplain, to replace an entrenched Rosgen Class G or F stream channel.
- **Priority 2 Restoration** involves establishment of a stable Rosgen Class C or E stream channel and floodplain, at the current or higher (but not original) channel elevation, to replace an entrenched Rosgen Class G or F stream channel.
- **Priority 3 Restoration** involves converting to a new stream type without an active floodplain but containing a floodprone area (example, Rosgen Class G to B stream, or Rosgen Class F to Bc).
- **Priority 4 Restoration** involves stabilization of an incised stream channel in place using instream structures and bioengineering. Typical instream structures for bank stability include crossvanes, J-hook vanes, other rock vanes, single and double wing deflectors, and root wads that divert the thalweg from the streambank and/or absorb water energy. Bioengineering techniques include fascines, branch packing, brush mattresses, live cribwalls, tree revetments, or coir fiber logs, supplemented with use of erosion control matting and live staking for long term stability.

All proposed stream channel restoration/relocation mitigation plans shall include:

- (1) geomorphic data describing the existing stream, the reference reach upon which design criteria are based, and the proposed stream design (Table 2).
- (2) a conceptual design showing proposed stream pattern in the landscape; a final design showing proposed pattern, profile, and dimension should be provided the Corps and other reviewing agencies before construction;
- (3) a minimum 25-foot riparian buffer on both banks along the length of the project. Additional mitigation credit may be generated if buffers on one or both banks meet or exceed minimum buffer width, as defined in this SOP.

- **Streambank repair** is the stabilization of localized lateral streambank erosion using bioengineering techniques such as fascines, branch packing, brush mattresses, live cribwalls, tree revetments, or coir fiber logs,

Compensatory Stream Mitigation Definitions of Factors

supplemented with use of erosion control matting and live staking for long term stability. Streambank stabilization alone does not constitute Priority 4 Stream Channel Restoration. Credit for installation of streambank stabilization measures to stabilize localized lateral erosion will be based on 3X the length of the appropriate size structure (e.g., 600' for a 200' tree revetment).

- **Structure removal** refers to removal of existing pipes, culverts, dams, wiers, and other manmade structures that alter a stream's geomorphology or flows. A series of crossvanes or other appropriate grade control structures may be needed to reconstruct the channel profile and avoid a headcut if channel elevation above the location where the structure is to be removed is greater than channel elevation below the structure. Where dams are proposed to be removed, it generally is best to remove the dam to the level of sediment behind the dam and then to construct a series of crossvanes to develop a stable slope. To prevent disruption of fish movements, elevation drop from one crossvane to the next shall be no more than 0.5' (i.e., at least 4 crossvanes will be needed to develop a stable slope when channel elevation above and below a culvert to be removed drops 1.5'). The proposed structural removal will be assigned a credit factor of from 4.0 to 8.0, depending on the ecological lift associated with the specific action. The credit factor selected for a specific structural removal must be supported by information necessary to document ecological lift. Selection of an appropriate credit factor is at the sole discretion of the USACE. Credit for removal of manmade structures will be based on total length of stream impacted directly or indirectly by the structure (i.e., dam fill plus length of impounded stream; culvert fill plus upstream and downstream areas where aggradation/degradation can be attributed to the culvert).
- **Riparian Restoration, Preservation, and Habitat Improvement:** Riparian restoration, preservation, or habitat improvement, will not be allowed on Fully Impaired streams, as described in Existing Condition below.
 - **Riparian restoration** is the reestablishment of well-established stands of deep-rooted native vegetation (trees, shrubs, and herbaceous species) in areas adjacent to riverine systems.
 - **Riparian preservation** is the conservation of already well-vegetated buffers adjacent to riverine systems. Riparian buffer preservation may account for no more than 50% of the credits generated by a mitigation bank or required to mitigate for a single and complete project. If the mitigation plan for a single and complete project combines riparian buffer preservation with purchase of bank credits, non-bank buffer preservation may account for no more than 50% of the required credits.
 - **Riparian habitat improvement** is implementation of activities to improve the biological function of an existing buffer. Riparian habitat improvement may include planting of understory species, planting of desirable canopy trees, and/or timber stand improvement. Riparian habitat improvement is applicable only in buffers that already support well-established stands of deep-rooted native vegetation; activities proposed for riparian habitat improvement must be approved by the USACE.

Table 1. Riparian Buffer Mitigation Activities

		71-100% of the Proposed Buffer will be Planted (Extensive Restoration)	41-70% of the Proposed Buffer will be Planted (Substantial Restoration)	10-40% of the Proposed Buffer will be Planted (Moderate Restoration)	Riparian Habitat Improvement	The buffer does not Require Planting (Preservation)
Minimum Buffer Width on One Side of Stream) (MBW = 50' + 2'/% slope)	4X MBW	2.0	1.6	0.8	0.4	0.3
	3X MBW	1.5	1.2	0.6	0.3	0.2
	2X MBW	1.0	0.8	0.4	0.2	0.1
	1X MBW	0.3	0.2	0.1	0	0

Control means the entity empowered or responsible for enforcing the mitigation requirements.

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Dominant Impact:

- **Fill** means permanent fill of a stream channel due to construction of dams or wiers, relocation of a stream channel (even if a new stream channel is constructed), or other fill activities.
- **Pipe** means to route a stream for 100' or more through pipes, box culverts, or other enclosed structures.
- **Morphologic change** means to channelize, dredge, construct an armored ford, or otherwise alter the established or natural dimensions, depths, or limits of a stream corridor.
- **Impound** means to convert a stream to a lentic state with a dam or other retention/control structure that is not designed to pass normal flows below bankfull stage. Impact to the stream channel where the structure is located is considered fill, as defined above.
- **Stream Crossing** means to route a stream through pipes, culverts, or other structures where less than 100' of stream will be impacted per crossing.
- **Detention** means to temporarily slow flows (≤ 72 hours) in a channel when bankfull is reached. Areas that are temporarily flooded due to detention structures must be designed to pass flows below bankfull stage.
- **Bank armor** means to riprap, bulkhead, or use other rigid methods to contain stream channels.
- **Utility crossing** means pipeline/utility line installation methods that require disturbance of the streambed.
- **Shading and clearing** means activities, such as bridging or streambank vegetation clearing, that reduce or eliminate the quality and functions of vegetation within riparian habitat without disturbing the existing topography or soil. Although these impacts may not be directly regulated, mitigation for these impacts may be required if the impact occurs as a result of, or in association with, an activity requiring a permit.

Duration: Duration is the amount of time the adverse impacts to a stream reach are expected to last.

- **Temporary** means impacts will occur within a period of less than 1 year and recovery of system integrity will follow cessation of the permitted activity.
- **Recurrent** means repeated impacts of short duration (such as with on-channel 24-hour stormwater detention).
- **Permanent** means project impacts will occur for more than one year. This will also be used in cases where the impact will occur during spawning or growth periods for Federal and State protected species.

Existing Condition: The functional state of a stream reach before any project impacts or mitigation actions occur.

- **Fully Functional** means that the physical geomorphology of the reach is stable and the biological community likely is diverse. For the purposes of this SOP, a stream generally will be considered fully functional if it meets one or more of the following five criteria:
 1. the reach is not entrenched (entrenchment ratio >2.2 , excluding Rosgen Class A and B streams).
 2. the reach supports aquatic species listed as endangered, threatened, or rare by the U.S. Fish and Wildlife Service (USFWS) or Georgia Department of Natural Resources (GADNR) (refer to USFWS Georgia Field Office or GADNR web page),
 3. the stream is a State designated primary trout stream (refer to GADNR web site),
 4. the reach supports a diverse biological community (IBI Category classification of Good or Excellent, based on standardized IBI methodology).
 5. the stream is a GADNR Stream Team reference reach (refer to GADNR Fisheries).

The Corps, at its discretion, may designate the largest streams within an 8-digit HUC as fully functional, regardless of whether they meet the criteria above, based on these streams' recreational, commercial, and water supply values.

- **Somewhat Impaired** means that stability and resilience of the stream or river reach has been compromised, to a limited degree, but the system has a moderate probability of recovering naturally. For purposes of this SOP, a stream is considered somewhat impaired if none of the five criteria listed above for a fully functional stream are met but the stream meets one of the following four criteria:
 1. the stream reach is moderately entrenched (entrenchment ratio of 1.4-2.2, excluding Rosgen Class A and B streams)
 2. the channel is dominated by sand, gravel, cobble, boulders, or bedrock, rather than silt and clay
 3. bank erosion, excluding undercut banks often found in stable streams at bends, is localized

Compensatory Stream Mitigation Definitions of Factors

4. the stream reach supports a moderately diverse biological community (IBI Category classification of Fair).
- **Fully Impaired** means that there is a high loss of system stability and resilience. Recovery is unlikely to occur naturally without further bank erosion and/or aggradation, unless restoration is undertaken. For purposes of this SOP, a stream is considered fully impaired if none of the nine criteria listed above for fully functional or somewhat impaired streams is met. Common indicators of a fully impaired reach include a high entrenchment ratio (<1.4, excluding Rosgen Class A streams, which are naturally entrenched); low sinuosity (<1.2, excluding Rosgen Class A streams, which are naturally relatively straight); low biodiversity (IBI or IWB Category classification of Poor or Very Poor); extensive human-induced sedimentation; extensive bank erosion on both sides of riffle reaches; significant erosion of point bars or deposition of mid-channel bars within the reach; and/or extensive culverting, piping, or impoundment within the reach.

Geomorphic Definitions:

- **Bankfull Discharge** is the flow that is most effective at moving sediment, forming or removing bars, forming or changing bends and meanders, and doing work that results in the average morphologic characteristics of channels (Dunne and Leopold 1978). The bankfull stage is the point at which water begins to overflow onto a floodplain (may not coincide with the top of the visible bank in entrenched streams). On average, bankfull discharge occurs approximately every 1.5 years
- **Dimension** refers to the stream's width, depth, and cross-sectional area at bankfull.
- **Entrenchment Ratio** is an index value that describes the degree of vertical containment of a river channel. It is calculated as the width of the flood-prone area divided by bankfull width.
- **Reference Reach/Condition** – A stable stream reach generally located in the same physiographic ecoregion, climatic region, and valley type as the project that serves as the blueprint for the dimension, pattern, and profile of the channel to be restored.
- **Pattern**: Stream pattern describes the shape of a stream as seen from above, and includes factors such as sinuosity, meander length, radius of curvature, and beltwidth.
- **Stable Stream**: A naturally stable stream channel is one that maintains its dimension, pattern, and profile over time such that the stream does not degrade or aggrade. Naturally stable streams must be able to transport water and the sediment load supplied by the watershed.
- **Profile**: The profile of a stream refers to its longitudinal slope, including factors such as water surface slope, pool-to-pool spacing, and pool and riffle slopes.

Minimum Buffer Width: The **minimum buffer width** (MBW) for which mitigation credit will be earned is 50 feet on one side of the stream, measured from the top of the stream bank perpendicular to the channel. If topography within a proposed stream buffer has more than a 2% slope, 2 additional feet of buffer are required for every additional percent of slope (e.g., minimum buffer width with a +10% slope is 70'). Buffer slope will be determined in 50'-increments beginning at the stream bank. No additional buffer width will be required for negative slopes. For the reach being buffered, degree of slope will be determined at 100' intervals and averaged to obtain a mean degree of slope for calculating minimum buffer width. This mean degree of slope will be used to calculate the minimum buffer width for the entire segment of stream being buffered.

Mitigation Timing: No credits are generated for this factor if the proposed mitigation in a reach is primarily riparian buffer preservation or Riparian Habitat Improvement.

- **Non-Banks:**
 - Schedule 1:* All mitigation is completed before the impacts occur.
 - Schedule 2:* The mitigation is completed concurrent with the impacts.
 - Schedule 3:* The mitigation will be completed after the impacts occur.
- **Banks:** Use Schedule 2 (Note: release of credits will be based on a release schedule).

Monitoring and Contingencies: Monitoring and contingency plans are actions that will be undertaken during the mitigation project to measure the level of success of the mitigation work and to correct problems or failures. All projects shall include contingency actions that will achieve specified success criteria if deficiencies or failures are

Compensatory Stream Mitigation Definitions of Factors

found during the monitoring period. Monitoring is a required component of all mitigation plans. Mitigation Banks are required to develop an *Excellent M and C Plan*.

- **Minimum Level Restoration M&C:**

- **Riparian preservation/Riparian Habitat Improvement:** Collection of basic information on vegetation in the buffer and stability of the banks being buffered, following protocols provided by the Corps, unless another protocol is approved in advance. Information shall be collected on the following two factors at 0-, 3-, and 5-years after the mitigation is approved:
 - a. an evaluation of bank stability throughout the reach .
 - b. species composition, average species height and average species diameter at breast height (dbh) of woody vegetation within the buffer.
- **Riparian restoration:** Collection of basic information on vegetation in the buffer and stability of the banks being buffered. Information shall be collected on the following three factors before planting and annually for 5 years after planting (remediation and continued monitoring will be required if success criteria are not met after 5 years).
 - a. an evaluation of bank stability throughout the reach.
 - b. species composition, average species height and average species dbh of woody vegetation within the buffer.
 - c. survival and growth (height and dbh or other biomass measure) of planted vegetation.
- **Stream channel restoration, streambank stabilization and stream relocation:** Collection of baseline data on stream stability and water quality in streams before and after mitigation is implemented. Information shall be collected on the following four factors before mitigation activities are implemented and at 1-, 3-, and 5-years after mitigation activities are implemented (remediation and continued monitoring will be required if success criteria are not met after 5 years):
 - a. an evaluation of bank stability throughout the reach.
 - b. longitudinal and cross-sectional profiles of the restored, relocated, or stabilized reach.
 - c. mean depth, width, entrenchment ratio, maximum depth at bankfull, bank height ratio, substrate characteristics, and other geomorphic data, as indicated on Table 2.
 - d. surveying fish populations in the restored reach.

- **Moderate Level Restoration M&C Plans:**

- **Riparian preservation/Riparian Habitat Improvement:** Conducting all features under Minimum M&C, plus surveying bird, mammal, reptile, and amphibian life in the buffer and fish populations in the buffered reach at 0-, 3-, and 5-years after the mitigation is approved.
- **Riparian restoration:** Conducting all features under Minimum M&C, plus surveying bird, mammal, reptile, and amphibian life in the buffer and fish populations in the buffered reach at 0-, 3-, and 5-years after planting.
- **Stream channel restoration/streambank stabilization and stream relocation:** Conducting all features under Minimum M&C, plus surveying freshwater mussels and snails, crawfish, and other macroinvertebrates in the restored channel before mitigation activities are implemented and at 1-, 2-, and 5-years after mitigation activities are implemented.

- **Substantial Level Restoration M&C:** Conducting all features listed under Moderate M&C, plus simultaneous collection of these data in a suitable reference site. Substantial M&C Credit cannot be generated for Riparian Buffer Preservation or Habitat Improvement.
- **Excellent Level Restoration M&C:** Conducting all features listed under Substantial M&C at Year 7. For all banks, excellent level of M&C is required and an annual status report must be submitted until all credits are sold. Substantial M&C Credit cannot be generated for Riparian Buffer Preservation or Habitat Improvement.

Compensatory Stream Mitigation Definitions of Factors

- **Priority Area:**
- **Primary Priority:**
 - Reaches with species listed as endangered, threatened, or candidate by FWS or GADNR
 - Primary trout streams
 - Streams identified by the GADNR Stream Team as having an excellent or good IBI score
 - Waters adjacent to other Corps' approved mitigation sites/banks or other protected lands
 - National Estuarine Research Reserves
 - Reaches in approved greenway corridors
 - Wild and Scenic Rivers
 - Outstanding Resource Waters
 - Essential Fish Habitat
- **Secondary Priority:**
 - Waters with species listed as Species of concern by FWS or rare/uncommon by GADNR
 - Secondary trout streams
 - State Heritage Trust Preserves
 - Anadromous fish spawning habitat
 - Designated shellfish grounds
- **Tertiary Priority:**
 - All other areas

Scaling Factor: The Scaling Factor is based on the cumulative length of stream, in feet, that will be affected by a given dominant impact.

Simon's Channel Evolution Stages:

- Stage I Stable stream connected to floodplain
- Stage II Disturbance
- Stage III Degradation; stream begins to entrench
- Stage IV Continued degradation and widening; significant bank erosion on both banks
- Stage V Stream continues to widen and form a floodplain; aggradation of sediment to form point bars
- Stage VI Quasi-stable stream with new, but lower, floodplain

System Credit: Bonus mitigation credit may be generated if proposed riparian mitigation activities include minimum width buffers on both sides of a stream reach and legal protection of a fully buffered stream channel. Condition 1 must be met to receive System Protection Credit for Condition 2.

**Compensatory Stream Mitigation
Definitions of Factors**

Table 2. Geomorphic measurements for stream restoration and relocation projects.

	Current Condition	Reference Reach Measurements			Designed Stream
		Mean	High	Low	
Drainage Area (square miles)					
Stream Type (Rosgen)					
W_{bkf} (Bankfull width in feet)					
D_{bkf} (Bankfull mean depth in feet)					
W_{fpa} (Width of floodprone area)					
A_{bkf} (Xsect. Area) = $W_{bkf} \times D_{bkf}$					
W_{bkf}/D_{bkf} ratio					
W_{fpa}/W_{bkf} (Entrenchment ratio)					
D_{max} (Max. depth at bankfull)					
$D_{max\text{tob}}$ (Max depth at top of bank)					
D_{max}/D_{bkf} (Max depth ratio)					
$D_{max\text{tob}}/D_{max}$ (Bank ht ratio)					
L_m (Meander length in feet)					
R_c (Radius of Curvature in feet)					
W_{blt} (Belt width in feet)					
K (Sinuosity)					
L_m/W_{bkf} (Meander length ratio)					
R_c/W_{bkf} (Radius of Curve ratio)					
W_{blt}/W_{bkf} (Meander width ratio)					
S_{val} (Valley slope)					
S_{chan} (Channel slope)					
S_{rif} (Riffle slope)					
S_{pool} (Pool slope)					
S_{run} (Run slope)					
S_{glide} (Glide slope)					
S_{rif}/S_{chan} (Riffle slope ratio)					
S_{pool}/S_{chan} (Pool slope ratio)					
S_{run}/S_{chan} (Run slope ratio)					
S_{glide}/S_{chan} (Glide slope ratio)					
$D_{max\text{pool}}$ (Max Pool depth in feet)					
W_{pool} (Width of pool in feet)					
L_{pool} (Length of pool in feet)					
L_{ps} (Pool-pool spacing in feet)					
A_{pool} (Pool area) = $W_{pool} \times L_{poo}$					
$D_{max\text{pool}}/D_{bkf}$ (Max pool depth ratio)					
A_{pool}/A_{bkf} (Pool area ratio)					
W_{pool}/W_{bkf} (Pool width ratio)					
L_{pool}/L_{bkf} (Pool length ratio)					
L_{ps}/W_{bkf} (Pool-pool spacing ratio)					
D16 (mm)					
D35 (mm)					
D50 (mm)					
D84 (mm)					
D95 (mm)					

WORKSHEET 1: ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Intermittent 0.1			Perennial Stream > 15' in width 0.4			Perennial Stream ≤ 15' in width 0.8		
Priority Area	Tertiary 0.5			Secondary 0.8			Primary 1.5		
Existing Condition	Fully Impaired 0.25			Somewhat Impaired 0.5			Fully Functional 1.0		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.2		
Dominant Impact	Shade/Clear 0.05	Utility X-ing 0.4	Bank Armor 0.7	Detention 1.5	Stream Crossing (≤ 100') 1.7	Impound 2.7	Morphologic Change 2.7	Pipe >100' 3.0	Fill 3.0
Scaling Factor (Based on # linear feet impacted)	< 100' impact 0	100-200' impact 0.05	201-500' impact 0.1	501-1000' impact 0.2	> 1000' impact 0.4 for each 1000' feet of impact (round impacts to the nearest 1000') (example: 2,200' of impact – scaling factor = 0.8; 2,800' of impact – scaling factor = 1.2)				

Reaches to Be Impacted	Reach 1	Reach 2	Reach 3	Reach 4
	Complete the Following for Each Reach to Be Impacted			
Simon Channel Evolution Stage				
Rosgen Stream Type/D50				
Criteria for Selecting Existing Condition for Each Reach				
Bankfull Width and Depth	Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)				
Factors	Reach 1	Reach 2	Reach 3	Reach 4
Stream Type Impacted				
Priority Area				
Existing Condition				
Duration				
Dominant Impact				
Scaling Factor				
Sum of Factors M =				
Feet Stream in Reach Impacted LF =				
M X LF =				

Total Mitigation Credits Required = (M X LF) = _____

WORKSHEET 2: STREAM CHANNEL RESTORATION, STREAM RELOCATION, AND STREAMBANK RESTORATION WORKSHEET

Net Benefit	All proposals must include at least a 25' riparian buffer on both banks Buffers $\geq 50'$ +2'/%slope also may generate riparian credit (use see buffer worksheet)				
	Streambank Stabilization	Structure Removal	Stream Channel Restoration and Stream Relocation		
	2.0	4.0 to 8.0	Priority 4 1.0	Priority 3 4.0	Priority 1 or 2 8.0
Monitoring/ Contingency	Minimal (Required) 0	Moderate 0.3	Substantial 0.4		Excellent 1.0
Priority Area	Tertiary 0.05		Secondary 0.2		Primary 1.0
Control	RC on restored channel and 25' buffer (Required) 0.1		Required RC + CE or GPP 0.3		Required RC + CE + GPP 0.5
Mitigation Timing	Schedule 3 0		Schedule 2 (Use for all banks) 0.1		Schedule 1 0.5

Factors	Reach 1	Reach 2	Reach 3	Reach 4
	Submit Representative Photographs a Completed Table 2 and Conceptual Restoration Design for Each Restored or Relocated Reach; Submit Photographs of Each Bank Where Streambank Stabilization will be Conducted			
Net Benefit				
Monitoring/Contingency (at least minimal M&C required)				
Priority Area				
Control (at least a RC required)				
Mitigation Timing				
Sum of Factors M =				
Feet Stream in Reach (do not count each bank separately) LF =				
M X LF =				

Total Channel Restoration/Relocation Credits Generated = (M X LF) = _____

WORKSHEET 3: RIPARIAN RESTORATION AND PRESERVATION WORKSHEET

Net Benefit - select value for each stream side	Riparian Restoration/Habitat Improvement/Preservation Factors – MBW = Minimum Buffer Width = 50'+2'/% slope Select Values from Table 1			
System Credit Condition 1	Condition 1: MBW restored or protected on both streambanks To Calculate Value: Average of the Net Benefit values for Stream Side A and Stream Side B			
System Credit Condition 2	RC Placed on Channel 0.05		RC and CE Placed on Channel 0.1	
M&C - select value for each stream side	Mimimal (Required) 0	Moderate 0.2	Substantial 0.25	Excellent 0.3
Priority Area	Tertiary 0.05	Secondary 0.2	Primary 0.7	
Control	RC on restored channel and 25' buffer (Required) 0.1	Required RC + CE or GPP 0.3	Required RC + CE + GPP 0.5	
Mitigation Timing - select value for each stream side	Schedule 3 0	Schedule 2 (Use for all banks) 0.05	Schedule 1 0.15	

Riparian Reaches		Reach 1	Reach 2	Reach 3	Reach 4
		Complete the Following for Each Riparian Reach			
Simon Channel Evolution Stage					
Rosgen Stream Type/D50					
Criteria for Selecting Existing Condition for Each Reach					
Bankfull Width and Depth		Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)					
Factors		Reach 1	Reach 2	Reach 3	Reach 4
Net Benefit	Stream Side A				
	Stream Side B				
System Credit: Condition 1 Met					
System Credit: Condition 2 met (applicable only if Condition 1 met)					
M&C (at least minimal M&C required)	Stream Side A				
	Stream Side B				
Priority Area					
*Control (at least a RC required)					
*Mitigation Timing (none for riparian preservation)	Stream Side A				
	Stream Side B				
Sum of Factors M =					
Linear Feet of Stream Buffered (do not count each bank separately) LF =					
M X LF =					

Total Riparian Restoration Credits Generated = (M X LF) = _____